GEOPHYSICAL PROSPECTION OF THE WINGOS SLAVE QUARTER SITE, BEDFORD COUNTY, VIRGINIA

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A Report Prepared for:

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INTRODUCTION

Wingos is located in Bedford County, Virginia near the town of Forest (Figures 1 and 2). The Wingos site is a late-eighteenth century slave quarter that was owned at one time by Thomas Jefferson as part of his home at Poplar Forest. On March 30-31, 2007, at the request of Dr. Barbara Heath of the University of Tennessee, Knoxville, a geophysical survey was conducted at the Wingos site by Dr. Gerald Schroedl, Stephen Yerka, and Daniel Brock from the The University of Tennessee, Knoxville. The purpose of this project was to detect cultural deposits related to the historic occupation of the site through the use of geophysical survey.

The total project area selected for geophysical survey covered approximately 8,000 m^2. The full grid measured 100 m east-west and 80 m north-south and contained a total of 20 20x20 m grids. The survey area was selected by Dr. Heath prior to the survey (Figure 3).

INSTRUMENTS, DATA COLLECTION AND PROCESSING

While performing the geophysical survey, the project area was tied into the real-world space using a Trimble ProXRH global positioning system (GPS) unit. All resulting geophysical output was georeferenced to corner control points and displayed in the NAD 1983 UTM Zone 17N projection. Geophysical equipment included the GeoScan FM-36 flux-gate gradiometer, a type of magnetometer.

MAGNETOMETER

The use of magnetometers has a long and successful record in the discovery, assessment, and interpretation of archaeological deposits (Kvamme and Ahler 2007). Magnetometers measure the strength of the magnetic field surrounding the sensor. For a gradiometer, two sensors are configured such that the gradient difference in the magnetic field is measured. The unit of measure is nanoteslas (nT). Any magnetic object or disturbance alters the background magnetic field. For example, geologic parent material of soils, water table, subsurface disturbances, and buried artifacts will influence the magnetic field. The magnetic field values are recorded and examined for spatial patterns.

The GeoScan FM-36 flux-gate gradiometer is a single sensor fluxgate gradiometer with data logger and one cylindrical sensor assemblyfor use in geophysics and archaeology. Readings were taken at 0.5 m intervals along the north-south axis. The data logger collected eight reading per meter along each pass.

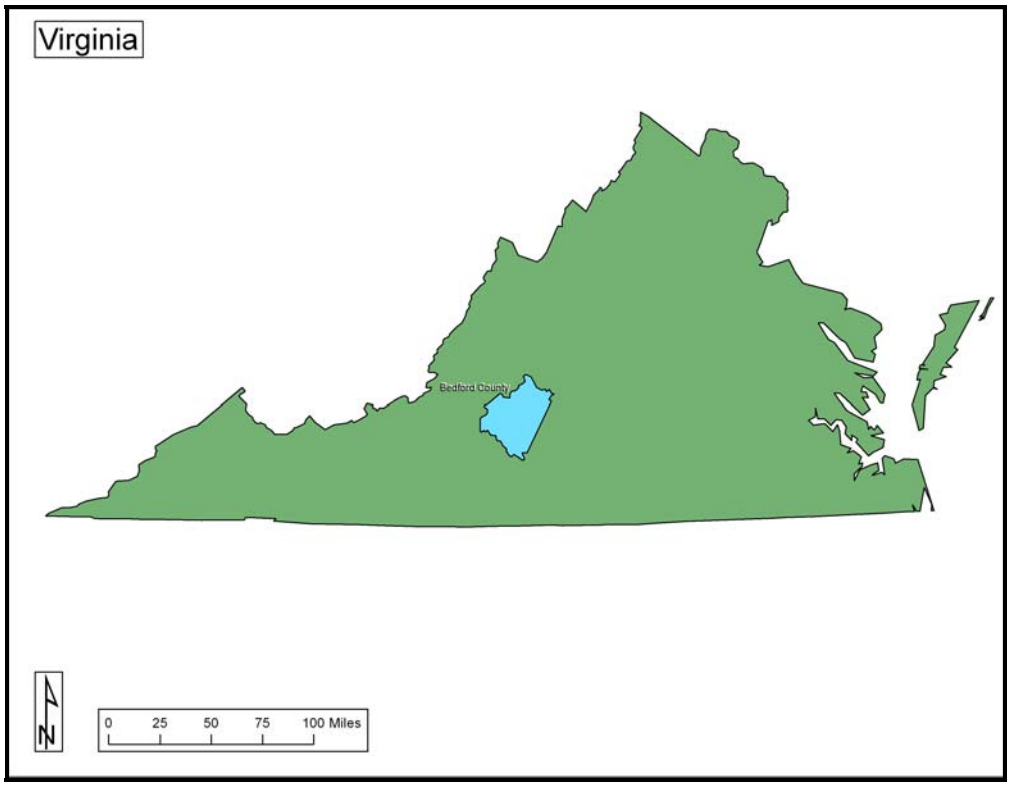

Figure 1. Map of Virginia showing the location of Bedford County.

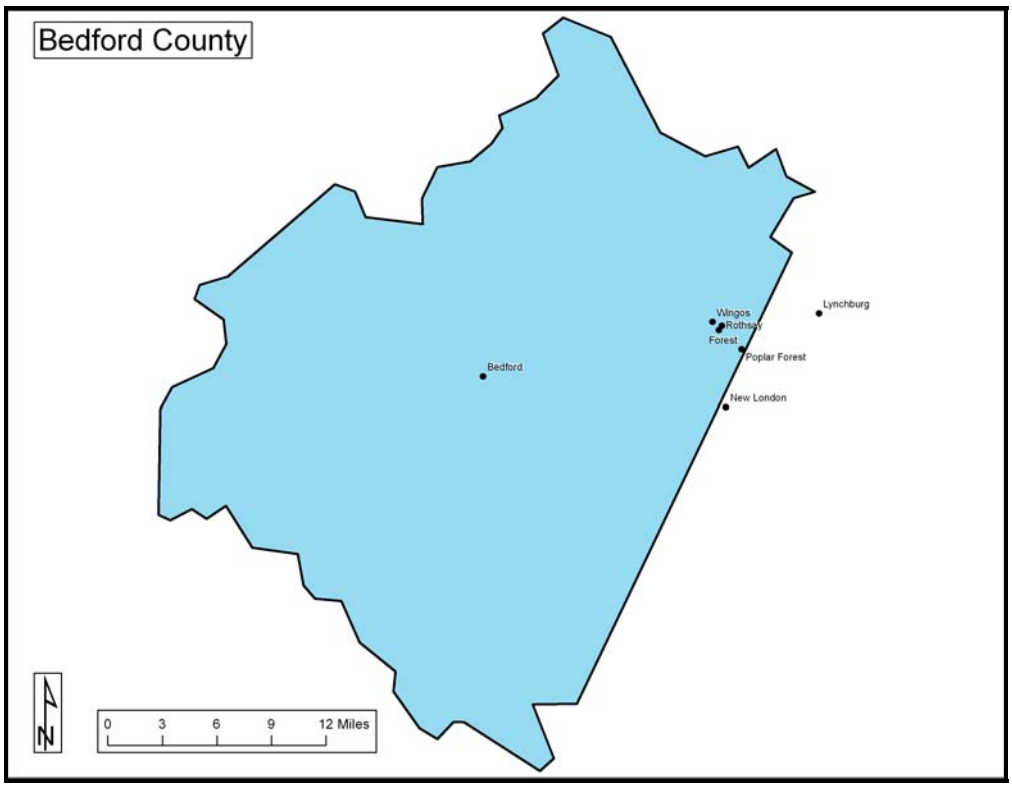

Figure 2. Map of Bedford County, VA showing the location of Wingos.

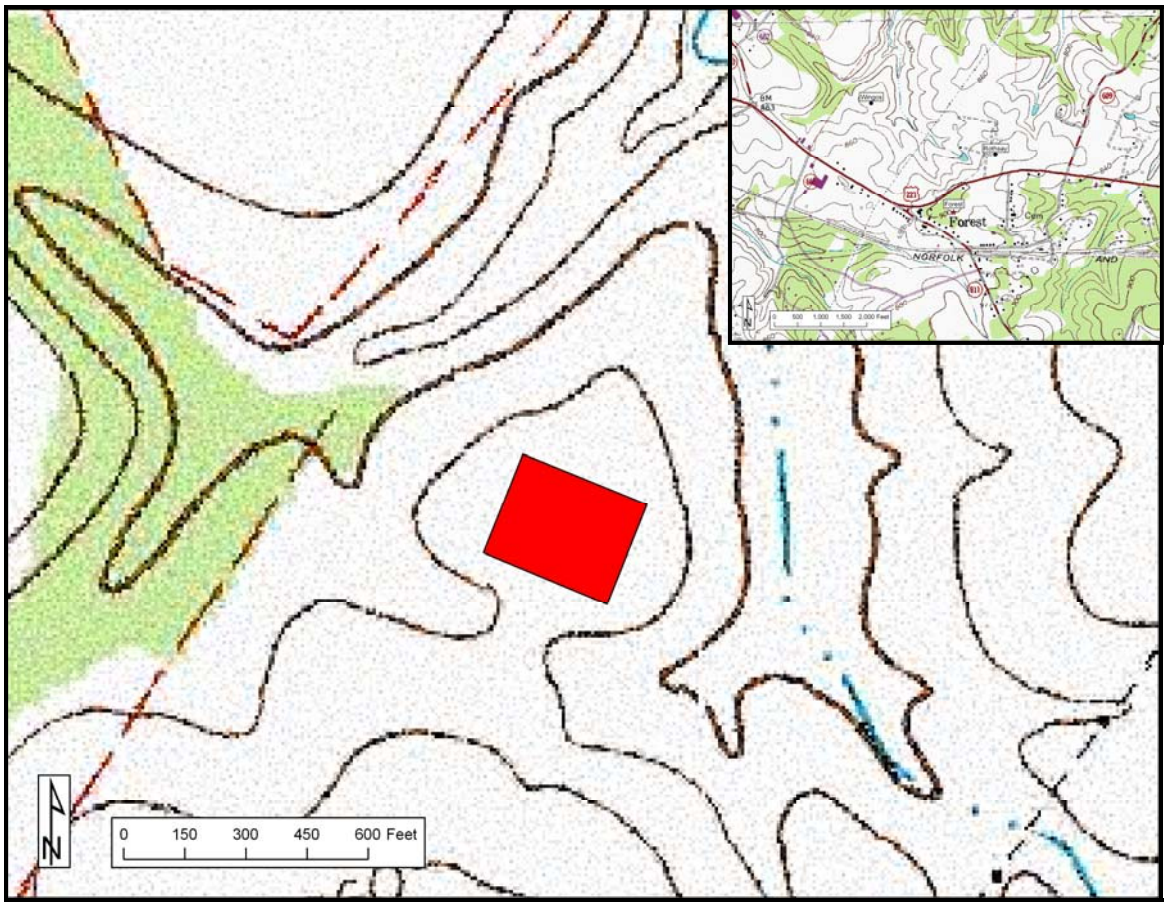

Figure 3. Area selected for geophysical study.

DISSCUSSION OF ANOMALIES

Figure 4 is a general key to the descriptions that are used throughout this report to classify anomalies. Classification is based on the amount of departure from the survey mean, and contrast at the boundary between the anomaly and surrounding background. Additionally anomalies are described as either singular, multiple or complex. Complex anomalies typically are created by overlapping multiple anomalies. When appropriate, anomalies will be characterized as to their possible composition. It is not within the scope of this report to highlight and characterize every anomaly in the following datasets; therefore the results section below is meant to provide a way for the reader to identify anomalies that are not discussed, but obviously appear in the output.

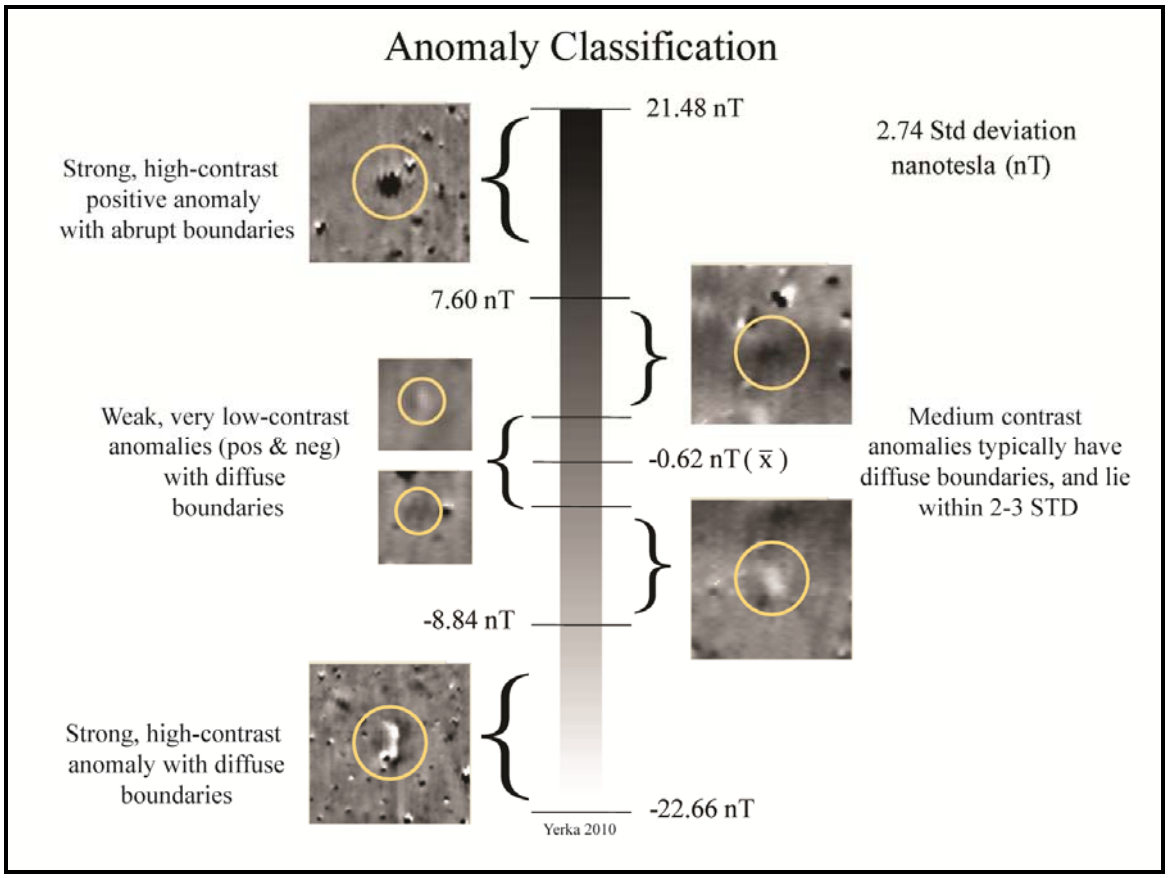

Figure 4. Anomaly classification (adapted from Yerka 2010).

RESULTS AND RECOMMENDATIONS

GRADIOMETER SURVEY

A geophysical survey using a gradiometer generates a map of the local magnetic variation within the study area. The magnetic background is the mean reading within the dataset and is represented by true gray in Figure 5. Any ferrous metal that is near or on the surface will create very high and/or low readings in the magnetic data and is represented by black and white. Gradation between white to black represents deviation from the mean, either positive (white) or negative (black). To preserve image contrast, outlier readings are removed from the dataset resulting in an empty cell (green background).

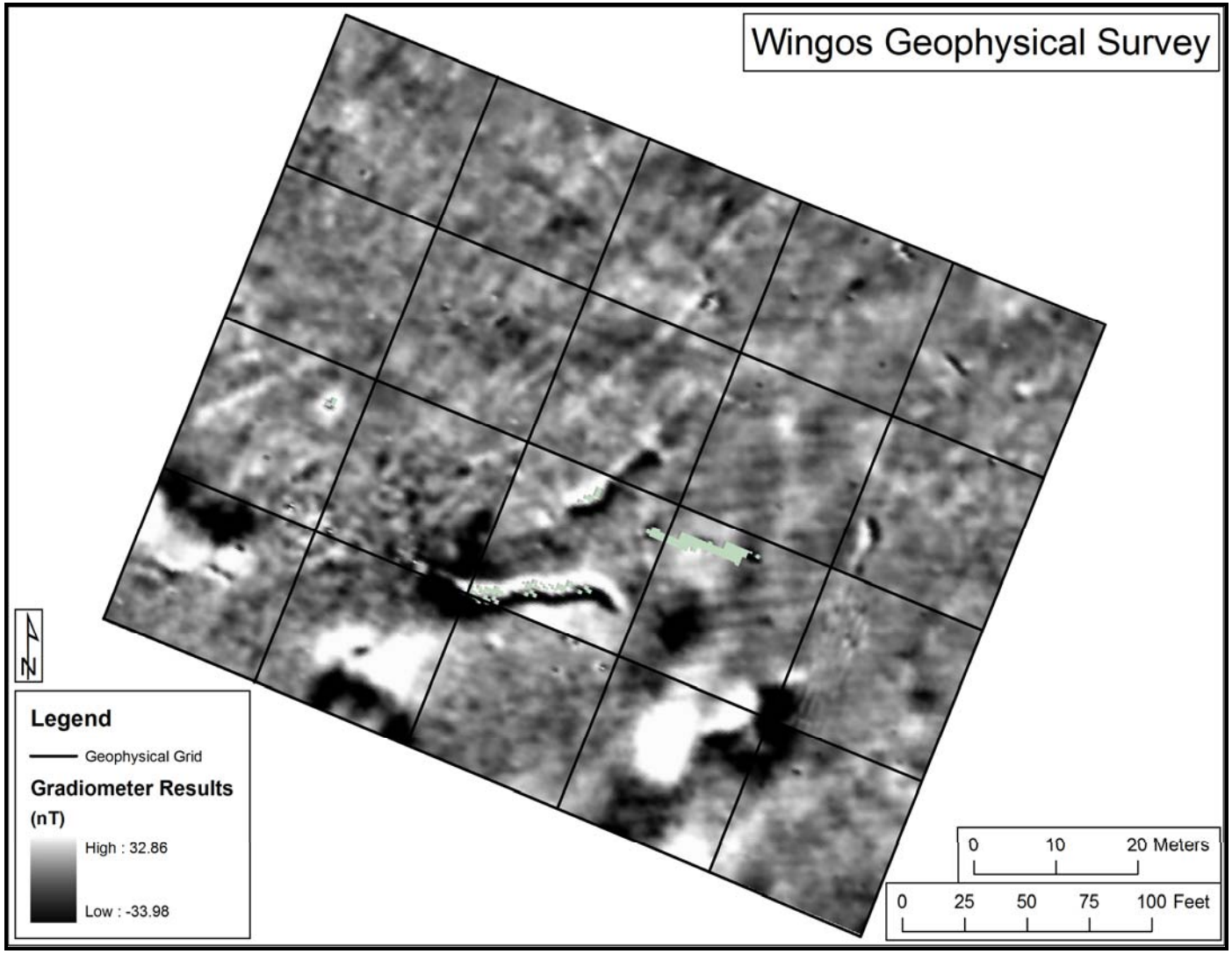

Figure 5. Results from the gradiometer survey.

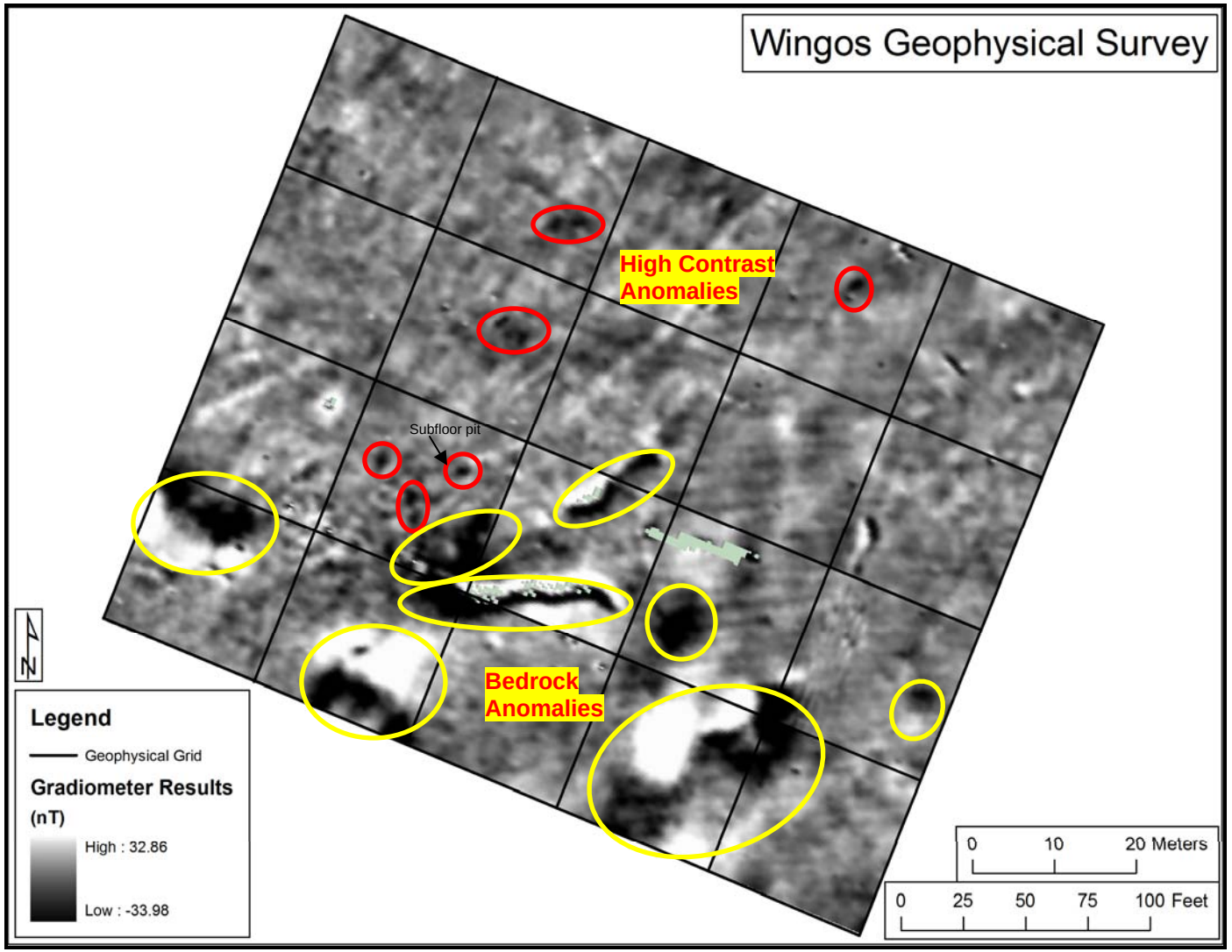

Figure 6. Results from the gradiometer survey with outlined anomalies highlighted.

Results of the geophysical survey within the project area suggest many subsurface anomalies. However, it is not certain that all of these are archaeological features. It is apparent that the local bedrock, greenstone, is highly magnetic and is visible in outcrop features near surface creating large dipole anomalies (black and white) outlined in yellow in Figure 6. These large features should be interpreted as non-cultural. Other features outlined in Figure 6 include high contrast negative anomalies (black) with strong boundaries ranging between -15 and -30 (nT) outlined in red. These anomalies should be considered cultural and possibly related to the historic occupation of the site. Ground-truthing of one of these anomalies within Excavation Record 281 showed positive results for cultural material. A subfloor pit filled with daub and stone was excavated in 2009 by Dr. Barbara Heath within this excavation unit and is labeled in Figure 6. Anomalies similar to this should be considered cultural and ground-truthed. Historic features most likely occur in the area immediately around the positively tested subfloor pit. Other outlined features outside of this area could however represent prehistoric features not associated with the historic component. Our recommendation for future geophysical survey includes initially scanning large areas with the gradiometer approach and then ground-truthing similar high contrast negative anomalies. Further gradiometer survey at the site should produce similar results and help to locate other late eighteenth-century features.

REFERENCES

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